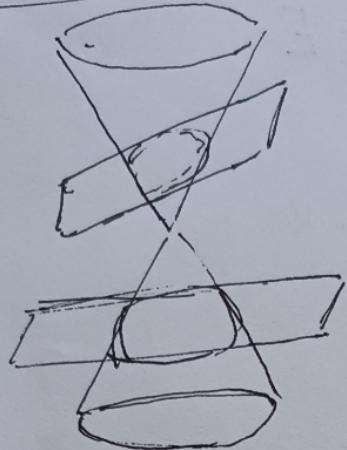


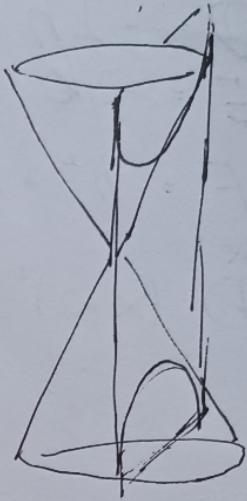
## Geometri Analitis



hyperbolik  
elips



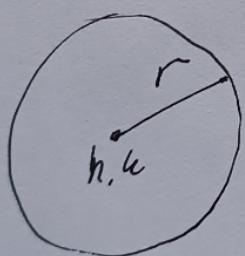
Parabola



Hyperbolik

### 1. lingkaran

Kemiringan titik jauj pada bidang mempunyai  
Jadi sama sebaiknya titik past



$P(x, y)$

$$r = \sqrt{(x-h)^2 + (y-k)^2}$$

$$(x-h)^2 + (y-k)^2 = r^2$$

Bentuk umum

$$x^2 - 2hx + h^2 + y^2 - 2ky + k^2 = r^2$$

$$x^2 + y^2 - 2hx - 2ky + h^2 + k^2 - r^2 = 0$$

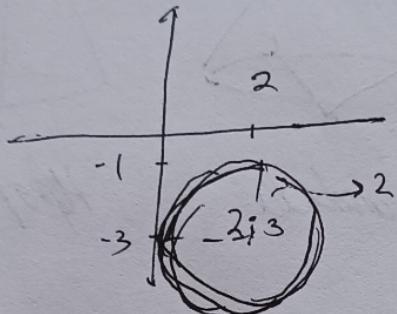
$$x^2 + y^2 + Dx + Ey + F = 0$$

$$D = -2h \rightarrow h = -\frac{1}{2}D$$

$$E = -2k \rightarrow k = -\frac{1}{2}E$$

$$F = h^2 + k^2 - r^2$$

ex  
①  $(x+2)^2 + (y+3)^2 = 4$



②  $x^2 - 4x + y^2 + 6y + 9 = 0$

$$h = -\frac{1}{2}(-4) = 2$$

$$k = -\frac{1}{2}(6) = -3$$

$$\begin{aligned}g &= F = h^2 + k^2 - r^2 \\&= (2)^2 + (-3)^2 - 4^2 \\&= 4 + 9 - 16 \\&= -3\end{aligned}$$

$$(3) 9x^2 + 18x + 9y^2 = 77$$

$$x^2 + \frac{18}{9}x + y^2 = \frac{77}{9}$$

$$h = -\frac{1}{2}\left(\frac{18}{9}\right) = -\frac{1}{2}\left(\frac{2}{3}\right) = -\frac{1}{6}$$

(4)

$$\overline{(-4, -3) \quad (h, k) \quad (2, 5)}$$

$$(h, k) = \left( \frac{-4+2}{2}, \frac{(-3)+5}{2} \right) = \left( \frac{-2}{2}, \frac{2}{2} \right) = (-1, 1)$$

$$\overline{(-5, 1)} \quad r = \sqrt{(2-(-1))^2 + (5-1)^2} = \sqrt{3^2 + 4^2} = 5$$

$$(x-h)^2 + (y-k)^2 = r^2$$

$$(x-1)^2 + (y-1)^2 = 25$$

$$r^2 > 0 \iff h^2 + k^2 - f^2 > 0$$

$$\left(-\frac{1}{2}D\right)^2 + \left(\frac{1}{2}F\right)^2 > f^2$$

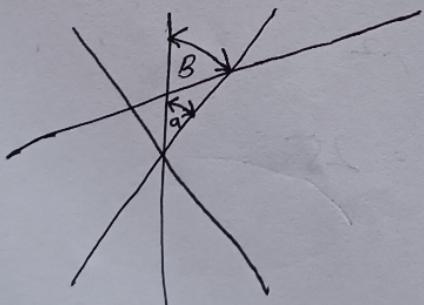
$$D^2 + F^2 > 4f^2$$

$$r^2 = 0 \Rightarrow D^2 + F^2 = 4f^2$$

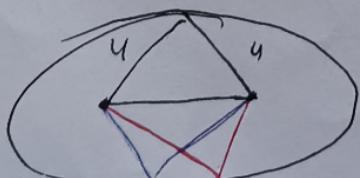
~~$r^2 < 0 \Rightarrow D^2 + F^2 < 4f^2$~~

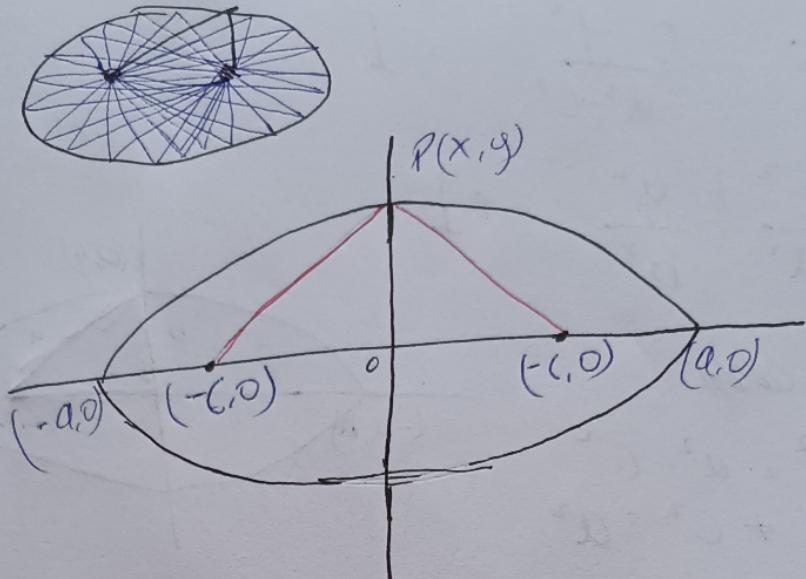
## 2 Ellipse

⇒ Another conic section formed by a plane intersecting a cone elliptically forward when  $\alpha < \beta < 90^\circ$



- set of all points in the plane
- sum of distance from two fixed points (foci) is a positive constant





$$|PF_1| + |PF_2| = 2a$$

$$\sqrt{(x+c)^2 + (y-0)^2} + \sqrt{(x-c)^2 + (y-0)^2} = 2a$$

$$\sqrt{(x+c)^2 + (y-0)^2}^2 = (2a - \sqrt{(x-c)^2 + y^2})^2$$

$$(x+c)^2 + y^2 = 4a^2 - 4a\sqrt{(x-c)^2 + y^2} + (x-c)^2 + y^2$$

$$x^2 + 2cx + c^2 = 4a^2 - 4a\sqrt{(x-c)^2 + y^2} + x^2 - 2cx + c^2$$

$$4cx = 4a^2 - 4a\sqrt{(x-c)^2 + y^2}$$

$$(a\sqrt{(x-c)^2 + y^2})^2 = (a^2 - cx)^2$$

$$a^2((x-c)^2 + y^2) = a^4 - 2a^2cx + c^2x^2$$

$$a^2x^2 - 2a^2cx + a^2c^2 + a^2 + y^2 = a^4 - 2a^2cx + c^2x^2$$

$$a^2x^2 + a^2c^2 + a^2y^2 = a^4 + c^2x^2$$

$$(a^2 - c^2)x^2 + a^2y^2 = a^4 + c^2x^2$$

$$(a^2 - c^2)x^2 + a^2y^2 = a^4 - a^2c^2 = a^2(a^2 - c^2)$$

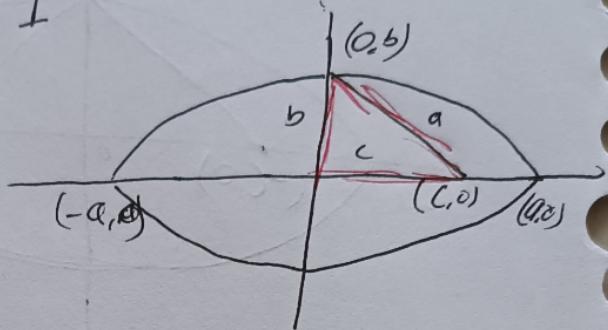
$$\frac{x^2}{a^2} + \frac{y^2}{a^2 - c^2} = 1$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

degan catatan

$$b^2 = a^2 - c^2$$

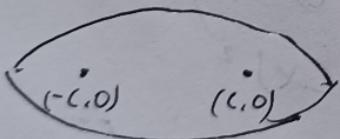
$$b^2 + c^2 = a^2$$



Major Axis on y Axis

$$\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$$

$$a > b$$

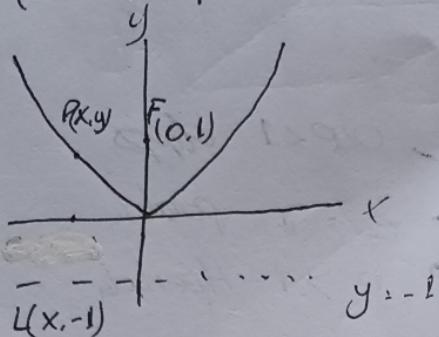


$$\frac{x^2}{25} + \frac{y^2}{16} = 1$$

$$\frac{x^2}{16} + \frac{y^2}{25} = 1$$

Parabola ( $R=1$ )

$$|PF| = |PL|$$

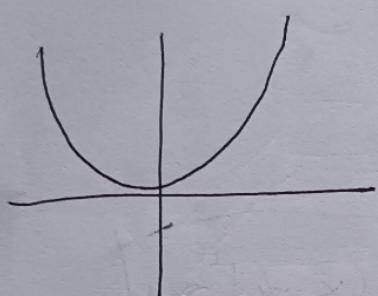


$$|PF| = |PL|$$

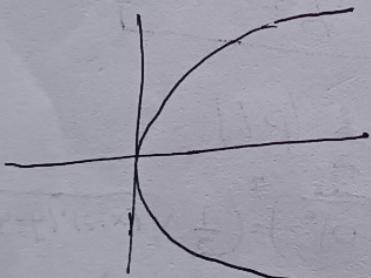
$$\sqrt{(x-0)^2 + (y-1)^2} = \sqrt{(x-x)^2 + (y-1)^2}$$

$$x^2 + y^2 - 2y + 1 = y^2 + 2y + 1$$

$$\begin{aligned}x^2 &= 4y \\y &= \frac{1}{4}x^2\end{aligned}$$



$$\begin{aligned}x^2 &= 4py && \text{ke atas} \\y_L &= -P \\F &= (0, P)\end{aligned}$$



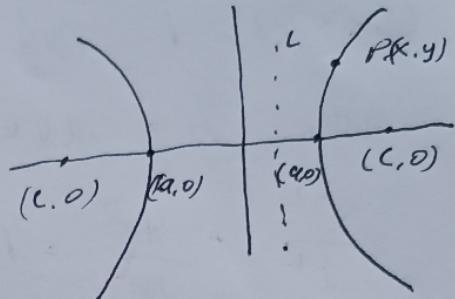
$$\begin{aligned}y^2 &= 4Px && \text{ke kanan} \\x_L &= -P \\F &= (P, 0)\end{aligned}$$

Hyperbola

$$|\text{PF}| = e |\text{PL}|$$

$$\begin{matrix} \downarrow \\ e > 1 \\ \downarrow \end{matrix}$$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$



$$\sqrt{(x-p)^2 + (y-0)^2} = \sqrt{(x+p)^2 + (y-y)^2}$$

$$(x-p)^2 + y^2 = (x+p)^2$$

$$x^2 - 2px + p^2 + y^2 = (x+p)(x+p)$$

$$x^2 - 2px + p^2 + y^2 = x^2 + 2px + p^2$$

$$y^2 = 4px$$

$$|(P_F)| = e|PU|$$

kena  $e > 1$  nch  $e^2 - 1 \geq 0$

maka  $b = a\sqrt{e^2 - 1}$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

$$\frac{x^2}{a^2} + \frac{y^2}{(e^2 - 1)a^2} = 1$$

kena  $e^2 - 1 \geq 0$

maka dapat dilihat

$$\frac{x^2}{a^2} + \frac{y^2}{(e^2 - 1)a^2} = 0$$

$$\frac{x^2}{a^2} - \frac{y^2}{(e^2 - 1)a^2} = 1$$

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$